SYSTEM AND METHOD FOR CONTROLLING A DOOR

BACKGROUND OF THE INVENTION

[0001] The invention generally relates to door opener control systems. More particularly, the invention relates to integrating a door opener control system into outdoor power equipment, such as a riding lawnmower.

[0002] A variety of systems exist for controlling a door, such as a garage door or other moveable barrier. Typically, systems include a transmitter that communicates with a receiver via wireless connection to change the state of the door (e.g., between open and closed positions). The receiver may be connected to the motor that controls door movement and the transmitter may be fixed at a location near the door, such as a wall of a garage. Alternately, the transmitter may be a portable unit with one or more buttons to control activation of the door. Some portable transmitters operate using rolling code or other security features. In addition, it is known to place transmitters within an automobile for remote actuation. Such systems are often employed so that an operator leaving their home may close the door and thereby improving home security. However, when a user operates outdoor power equipment, such as tractors, not in proximity to the house, an open garage door presents a security risk. Operators wishing to close the door must drive out of or to the door, exit the tractor, and manually activate the door. These steps take time and result in excessive starting and stopping of the tractor. In addition, current remote transmitters are not suited for attachment on lawn and garden equipment.

SUMMARY OF THE INVENTION

[0003] Disclosed is a system and method for integrating a door opener control system into outdoor power equipment such as a riding lawnmower. In one embodiment, the system generally includes a transmitter coupled to a piece of outdoor power equipment, a switch in communication with the transmitter, and a power supply. The transmitter is operable to remotely control the door between an open position and a closed position in response to a condition of the switch. The transmitter includes a circuit that transmits information to a one of several types of receivers associated with the door. The switch may be implemented with a variety of contact and non-contact type switches mounted on an instrument panel of the outdoor power equipment, and may communicate with the transmitter by a cable or a wireless

connection. The power supply may include a battery or a part of an ignition system, such as a magnet moving past a coil or an alternator.

[0004] Additional embodiments of the invention include a method for integrating a door opener control system into outdoor power equipment having an engine. The method includes mounting a transmitter on a piece of outdoor power equipment, connecting the transmitter module to a power supply, mounting a switch on a panel of the outdoor power equipment accessible to an operator, establishing communication between the switch and the transmitter, and activating the transmitter in response to a condition of the switch.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is a perspective view of one exemplary piece of outdoor power equipment according to one embodiment of the invention.

[0006] FIG. 2 is a detail view of the exemplary piece of outdoor power equipment including an exemplary configuration of components generally associated with one embodiment of the invention.

[0007] FIG. 3 is a detail view of another configuration of components generally associated with one embodiment of the invention.

[0008] FIG. 4 is a detail view of an exemplary instrument panel associated with the exemplary outdoor power equipment.

[0009] FIG. 5 is a perspective view of another exemplary piece of outdoor power equipment according to one embodiment of the invention.

[0010] FIG. 6 is a perspective view of yet another exemplary piece of outdoor power equipment according to one embodiment of the invention.

[0011] FIG. 7 illustrates an exemplary garage door assembly.

[0012] FIG. 8 is an exemplary schematic diagram of a transmitter circuit according to one embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Before embodiments of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of the examples set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or carried out in a variety of applications and in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of "including," "comprising," or "having" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. The terms "mounted," "connected," and "coupled" are used broadly and encompass both direct and indirect mounting, connecting, and coupling. Further, "connected" and "coupled" are not restricted to physical or mechanical connections or couplings.

[0014] It should be noted that the principles of the invention are illustrated as being applied to a riding lawnmower 10 (FIG. 1). However, the invention is not limited to lawn and garden tractors and may be implemented with other types of outdoor power equipment including farming-type tractors. The invention may be used with types of outdoor power equipment other than tractors, such as walk-behind lawnmowers and portable generators.

[0015] As illustrated in FIG. 1, the exemplary riding lawnmower 10 includes an engine 12, which may be a variety of internal combustion-type engines. FIG. 2 is a detail view of an exemplary compartment that houses the engine 10. A door switch 14, the back side of which is shown coupled to the instrument panel 16, is coupled to a transmitter 18 that is mounted on the engine 12. The hardware for mounting the door switch 14 to the instrument panel 16 may include a variety of fastening means such as clips, bolts, adhesives, rivets, or many others. In one embodiment, a wire or cable 20 connects the door switch 14 to the transmitter 18. A switch connector 22 may also be implemented to allow a modular design where, for example, the door switch 14 and transmitter 18 are installed separately and then coupled via the switch connector 22. Although the transmitter 18 is illustrated as being mounted to the engine 12, it should be noted that the transmitter 18 may be located in one of a plurality of locations including, for example, on a wall of the engine compartment or under the tractor seat. The transmitter 18 is connected to a power supply such as a battery 24. Alternatively, the transmitter 18 may be connected to an ignition system and receive power derived from an ignition coil or alternator. The power connection may be implemented with one of a variety

of modular connections including a cable 20a and a plug 26, which may be similar to the switch connector 22. One should note that the power plug 26 and switch connector 22 are not necessary to implement the invention, but may be used to create a modular system in which installation and component replacement complexity is reduced that may be retrofit onto existing outdoor power equipment. As described below, the transmitter 18 may include one or more switches or buttons 40 used for code learning or other setup routines.

[0016] FIG. 3 illustrates another embodiment of the invention where a transmitter 18a is integrated with the door switch 14 and includes one or more code learning switches or buttons 40a and an integrated battery 28, such as a lithium battery 28, as a power supply. In this embodiment, the transmitter 18a is relatively small such that it does not interfere with instrumentation behind the panel 16.

[0017] FIG. 4 illustrates an exemplary instrument panel 16 associated with the riding lawnmower. The panel 16 may include a variety of controls and displays such as throttle control 30, an engine start key 32, and the like. In addition, the panel 16 includes an aperture with the door switch 14 disposed therein. The door switch 14 may be one of a variety of momentary contact switches that may be depressed or actuated by a user. Alternatively, the door switch 14 may be implemented with a non-contact type switch, such as a Hall or other magnetic-based switches.

[0018] FIGS. 5 and 6 illustrate other exemplary outdoor power equipment suitable for use with the invention. More specifically, FIG. 5 illustrates a walk-behind lawnmower 34 including an engine 10a. In one embodiment, a transmitter 18b is mounted to the engine 10a and includes one or more learning buttons or switches 40b as described below. In addition, a door switch 14a may be mounted to an instrument panel 16a and coupled to the transmitter 18b via cable 20c. In addition, the transmitter 18b may be coupled to the ignition system of the engine 10a using power cable 20c or similar means. FIG. 6 illustrates a portable generator 36 including an engine 10b. A transmitter 18c is mounted to the engine 10b and includes one or more code learning switches or buttons 40c. In one embodiment, a door switch 14b may be integrated with the transmitter 18c and, therefore, coupled to the engine 10b. The transmitter 18c may be coupled to a power supply, such as the ignition system of the engine 10b, using a cable 20d or other means.

[0019] In operation, the transmitter 18, 18a, 18b, 18c of all embodiments is operable to communicate with a receiver 38, illustrated in FIG. 7, which in turn communicates with a drive system 42 to control the position of a movable barrier, such as a garage door 44. Communication between the transmitter and the exemplary receiver 38 may be carried out using a variety of known infrared or radio frequency transmission protocols. The transmitter may be programmed with receiver dual in-line package ("DIP") switches or other known code learning techniques such that the transmitter 18, 18a, 18b, 18c is operable to communicate with one of several types of receivers 38. For example, programming the transmitter may include actuating a code learning mechanism 41 on the receiver 38 while simultaneously actuating one or more code learning switches or buttons 40, 40a, 40b, 40c located on the transmitter (See FIGS. 2-6). The transmitter may also be implemented to function with other security features such as cycling or rolling codes that change with each actuation of the receiver 38.

[0020] FIG. 8 illustrates an exemplary schematic of the transmitter 18, 18a, 18b, 18c. The schematic includes an exemplary controller 46, a code learning/setting block 48, and a transmitting element 50. In at least one embodiment, components of the transmitter 18, 18a, 18b, 18c may be similar to those included in commercially available universal or programmable garage door transmitters. For example, embodiments of the invention may be implemented with a universal transmitter such as the Model CLT1 transmitter manufactured by the Clicker subsidiary of The Chamberlain Group, Inc. The code learning/setting block 48 may represent DIP switches, buttons, infrared elements, or other components, including those represented by switches 40, 40a, 40b, and 40c, used to implement known code learning techniques. As described above, the code learning/setting block 48 may be implemented to allow communication between a variety of receivers 38. The transmitter element 50 may be implemented with an antenna or other elements including light emitting diodes ("LEDs") and the controller 46 may include a variety of passive and/or semiconductor-based circuit components. It should be understood that the transmitter 18, 18a, 18b, 18c is not limited to the exemplary schematic in FIG. 8 and that other additional or alternative components may be included.

[0021] In operation, a user operating the tractor 10 may desire to open or close the door 44 and thus actuate the door switch 14 on the instrument panel 16 (FIG. 4). In one exemplary configuration, an input of the controller 46 receives a signal indicating the door switch 14

was actuated and, in response, switches the state of an output device such as a transistor Q1 (FIG. 8), or other device, such that the transmitter element 50 is activated. The transmitter element 50 emits or communicates data, which is received by the desired receiver, such as receiver 38. Having received a valid signal from the transmitter 18, 18a, 18b, 18c, the receiver 38 controls or instructs the driver system 42 to open or close the garage door 44.

[0022] As described above, one embodiment of the invention provides a method and system for integrating a door opener control system into outdoor power equipment. Various features and aspects of the invention are set forth in the following claims.